Nuclear Energy University Programs

FY 2012 University Program Implementation

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2012 DOE-NE Road Map

Mission

Advanced Nuclear Energy Technologies

R&D Objectives

- Sustain Current Fleet
- Improvements in Affordability
- Sustainable Fuel Cycles
- Reduced Proliferation Risk

Enabling Technologies

- Structural Materials
- Nuclear Materials
- Reactor and Fuel Cycle Systems
- Instrumentation and Controls
- Power Conversion Systems
- Process Heat Transport System
- Dry Heat Rejection
- Separation Processes
- Waste Forms
- Risk Assessment Methods
- Nuclear Fuel Resources
- Computational Modeling & Simulation

Funding is Program Driven

DOE-NE HQ

Universities

High

DOE-NE Program Drivers

Low

Program Directed Funding

Program Supported Funding

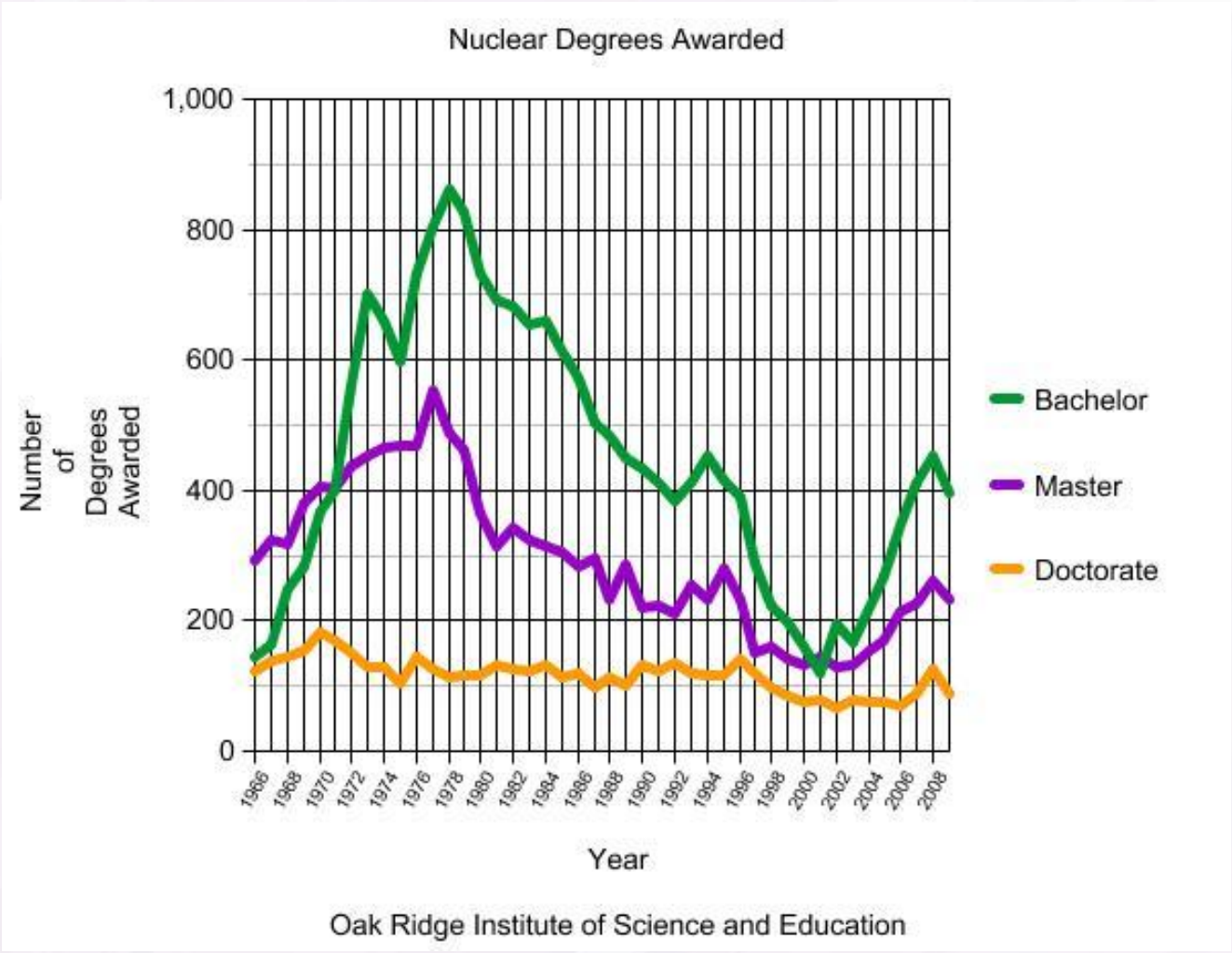
Mission Supported Funding

Relevancy Review

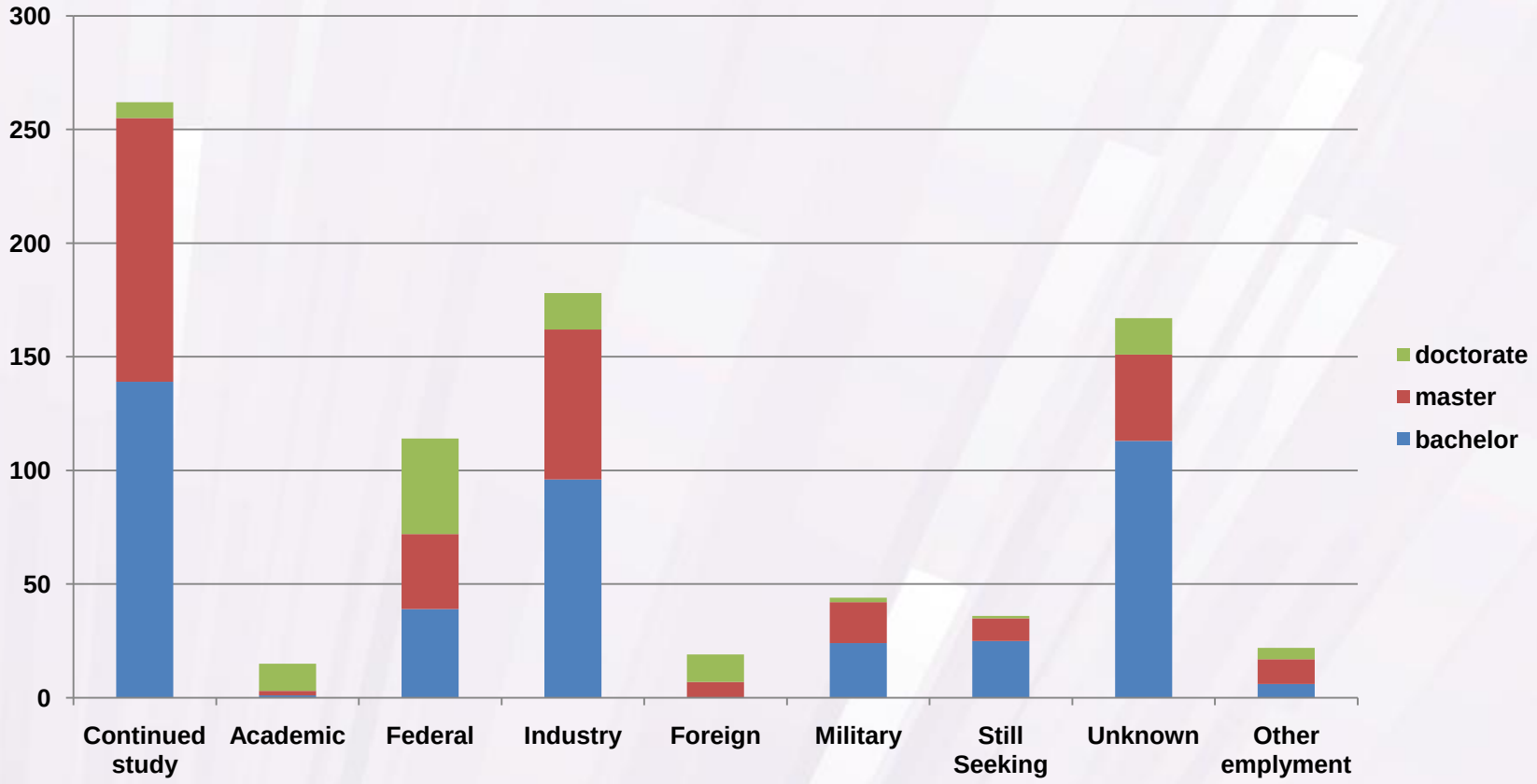
Peer Review

Nuclear Energy University Program Awards
2009 – 2010

The Nuclear Renaissance is Apparent to Students



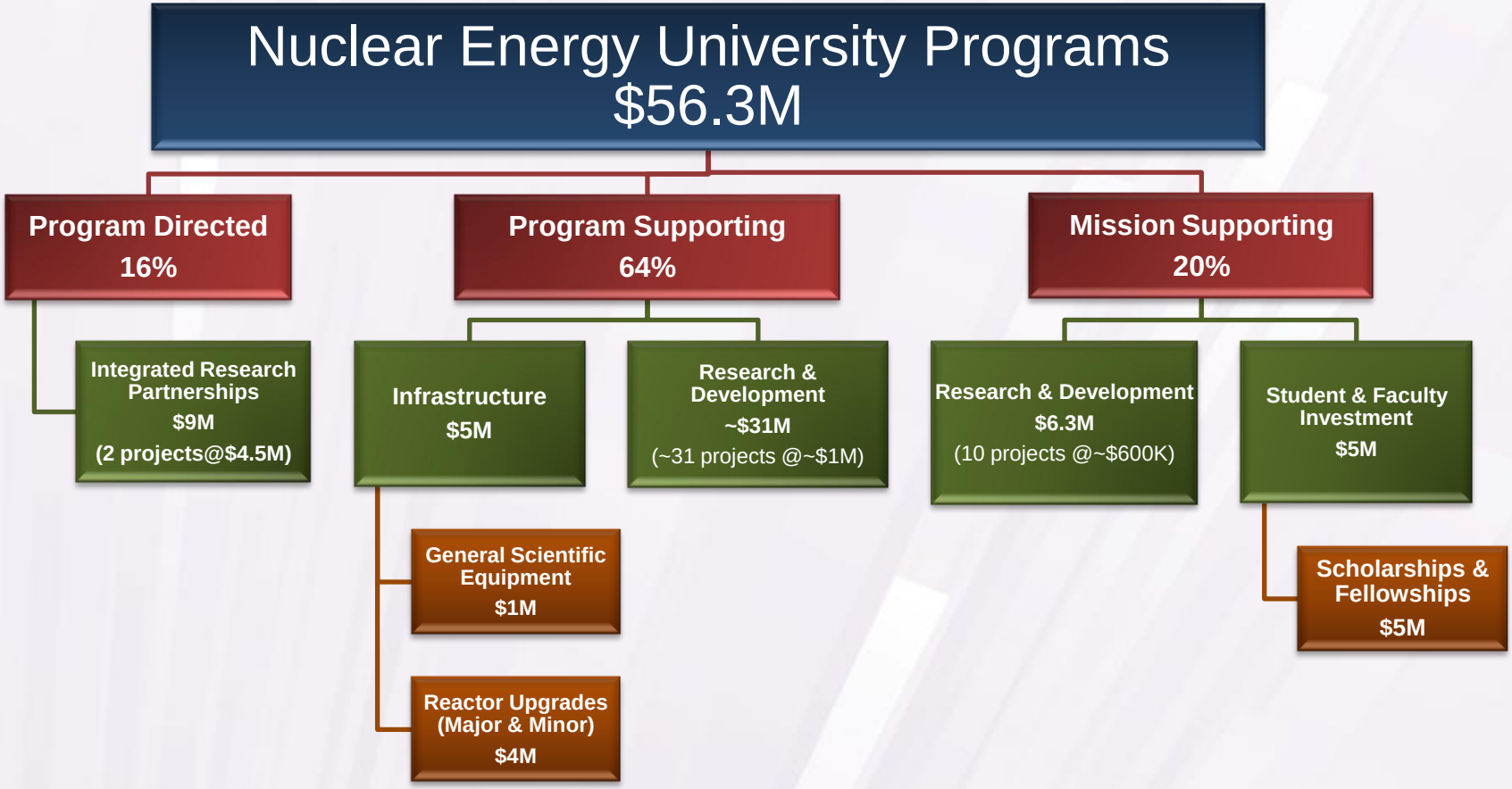
Where Graduates Go 2010



Previous NEUP Funding

Awards	FY 2009 NEUP	FY 2010 NEUP	FY 2011 NEUP
University Research & Development (R&D) Awards (from 20% of the NE R&D budget)	$44 million. 71 awards to 31 schools in 20 states.	$38 million. 42 awards to 23 schools in 17 states.	$39 million 51 awards to 31 schools in 21 states.
Integrated Research Projects(from 20% of the NE R&D budget)	N/A	N/A	TBA
University Infrastructure Awards (from 20% of the NE R&D Budget)	$6 million 29 schools in 23 states for scientific equipment	$13.2 million 39 schools in 27 states for research reactor upgrades and scientific equipment	TBA
University Student Fellowship and Scholarship Awards	$3.1 million 76 scholarships and 18 fellowships	$5.0 million (IUP) 85 scholarships and 32 fellowships	TBA (IUP)
Total	**$53,000,000**	**$56,200,000**	**About $60M**

Sample Breakdown for a $56.3M Budget



Example Workscope Areas

Fuel Cycle R&D:

Program Supporting:

FC 1: Jim Bresee (Terry Todd – Laboratory POC)

FC 2: Frank Goldner (Kemal Pasamehmetoglu – Laboratory POC)

FC 3: Dan Vega (Mark Mullen – Laboratory POC)

FC 4: Syed Bokhari (Peter Swift – Laboratory POC)

FC 5: Bradley Williams (Temi Taiwo – Laboratory POC)

Mission Supporting:

MS-FC: Bradley Williams (Mike Goff – Laboratory POC)

Reactor Concepts RD&D:

Program Supporting:

SMR 1: Tim Beville (Dan Ingersoll – Laboratory POC)

SMR 2: Tim Beville (Dan Ingersoll – Laboratory POC)

NGNP 1: Steve Reeves (Hans Gougar – Laboratory POC)

NGNP 2: Carl Sink (Hans Gougar – Laboratory POC)

LWRS 1: Rich Reister (Jeremy Busby – Laboratory POC)

LWRS 2: Rich Reister (Robert Youngblood – Laboratory POC)

LWRS 3: Rich Reister (Bruce Hallbert – Laboratory POC)

LWRS 4: Rich Reister (George Griffith – Laboratory POC)

ARC 1: Brian Robinson (Robert Hill – Laboratory POC)

ARC 2: Brian Robinson (Jim Sienicki – Laboratory POC)

ARC 3: Brian Robinson (Jeremy Busby – Laboratory POC)

Mission Supporting:

MS-RC 1: Sal Golub (Robert Hill – Laboratory POC)

MS-RC 2: Wade Carroll

NEAMS:

Program Supporting:

NEAMS 1: Jim Peltz (Xin Sun – Laboratory POC)

NEAMS 2: Rob Versluis (Dave Pointer – Laboratory POC)

NEAMS 3: Jim Peltz (Jim Stewart – Laboratory POC)

Workscope Descriptions-Example, Points of Contact, see at www.NEUP.gov

Advanced Mitigation Strategies (LWRS-1) –
(FEDERAL POC – RICH REISTER & TECHNICAL POC – JEREMY BUSBY)

Advanced mitigation strategies and techniques. Extended operating periods may reduce operating limits and safety margins of key components and systems. While component replacement is one option to overcome materials degradation, other methods (e.g. thermal annealing or water chemistry modification) may also be developed and utilized to ensure safe, long-term operation. Validation and/or development of techniques to reduce, mitigate, or overcome materials degradation of key LWR components are sought. Mitigation strategies for pressure vessel steels, core internals, weldments, or concrete are encouraged. Universities engaging in this effort will be expected to produce concepts, supporting data and/or model predictions demonstrating the viability of mitigation strategies for key LWR components.

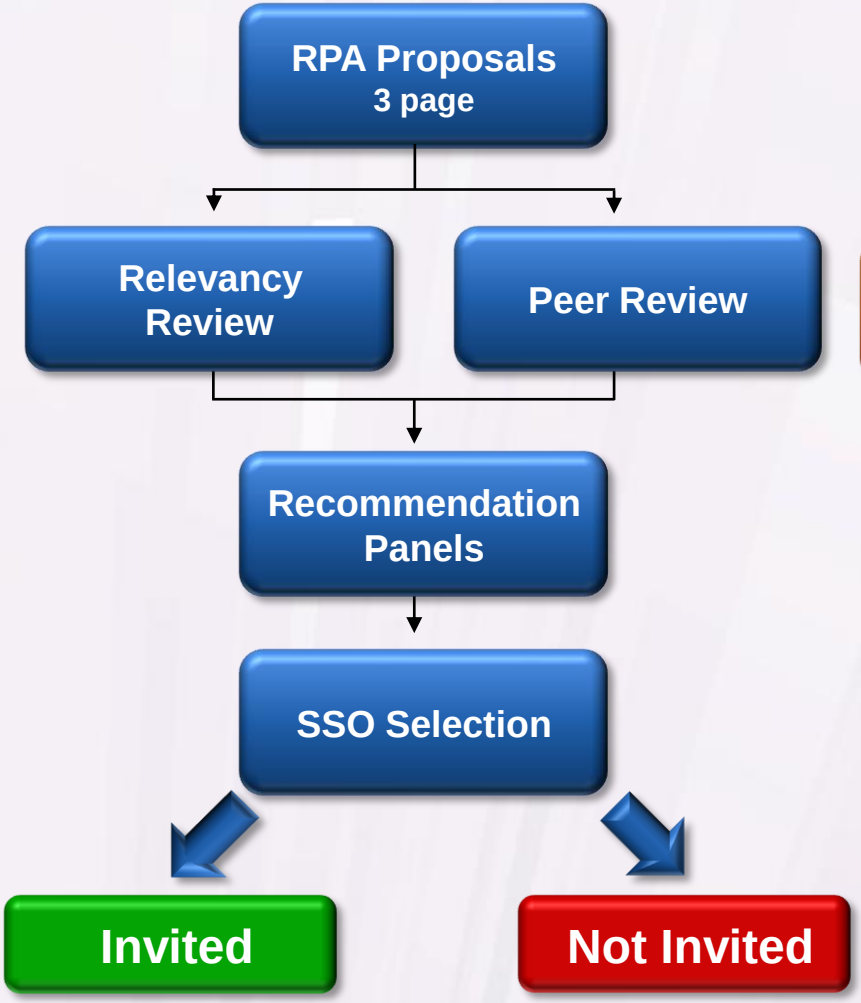
Technical Points of Contact

For a current list, visit www.neup.gov.

2012 R&D Federal/Technical Points of Contact

Technical Bins & Workscopes	Federal POC	Technical POC
Fuel Cycle Research and Development (FCR&D)		
Program Supporting		
FC-1 - Separations and Waste Forms	Jim Bresee (301) 903-1869 James.Bresee@nuclear.energy.gov	Terry Todd (208) 526-3365 Terry.Todd@inl.gov
FC-2 - Advanced Fuels	Frank Goldner (301) 903-3346 Frank.Goldner@nuclear.energy.gov	Kemal Pasamehmetoglu (208) 526-5305 Kemal.Pasamehmetoglu@inl.gov
FC-3 - Nuclear Materials Safeguarding and Instrumentation	Dan Vega (301) 903-7722 Daniel.Vega@nuclear.energy.gov	Mark Mullen (505) 665-0312 Mmullen@lanl.gov
FC-4 - Used Nuclear Fuel Disposition	Syed Bokhari (301) 903-8033 Syed.Bokhari@nuclear.energy.gov	Peter Swift (505) 284-4817 Pnswift@sandia.gov
FC-5 - Fuel Cycle Options Analysis	Brad Williams (301) 903-3442 Bradley.Williams@nuclear.energy.gov	Temi Taiwo (630) 252-1387 Taiwo@anl.gov
Mission Supporting		
MS-FC	Brad Williams (301)903-3442 Bradley.Williams	Mike Goff (208) 526-1999 Mike.Goff@inl.gov

R&D Review Process



Reviewer Qualification and Database for 2011-12

- New reviewer data base created and maintained
- Qualifications based on experience and expertise
- Reviewers pre-approved by DOE-NE and reported to DOE
- Will integrate reviewer database with proposal review system
- Conflict-of-interest stringently implemented
- More qualified reviewers needed!

Summary of Proposed New Programs and Procedures for 2012

- Programs:
  - Sustained NEUP Budget
  - Integrated Research Partnerships (PD)
  - Blue Sky(MS) – Aim for innovative faculty
- Procedures:
  - Peer reviewer qualification process and database
  - Enhanced Peer Review Process and Feedback
  - Clear workscopes with broader reach

Mission Supporting Transformative "Blue Sky"

- Nuclear Energy *mission relevant*, creative, innovative, research.
- Proposals should be relevant to NE's mission though may not fully align with the solicitations specific initiatives and programs.
- Examples include NS&E research in the fields or disciplines of:

Nuclear Engineering	Nuclear Physics
Nuclear Materials Science	Health Physics
Radiochemistry	Nuclear Chemistry

Program Directed Integrated Research Partnerships

- Nuclear Energy Program Directed partnership between two or more Universities to address a specific need of the program or solve an identified problem.
- Scope of request to be defined by the programs.
- Develop a capability in a broad technical area.
- Example: Develop Advanced Molten Salt Reactor Testing Capability.

Integrated Research Programs (IRP)

- NEUP anticipates accepting proposals for IRPs focused on development of advanced reactor project and supporting experimental testing capabilities and fuel cycle project.
- Projects will be for 3 years.
- Proposing teams *must* include:
  - Designated lead university and at least one other university.
- Proposal teams are *encouraged* to include:
  - One or more industry partner (may receive funding).
  - One or more National Laboratory (may receive funding).

Proposed Integrated Research Partnerships (IRP) and Blue Sky Programs

- IRPs(PD) focused on theme with deliverables(ex. separations)
- Multidisciplinary and Multi-institutional
- $1.5M per year for three years
- Based on DNDO, NSF models
- Technical Quality Weight (peer review) – up to 50%
- Blue Sky(MS) projects increased in number, scope and total investment
- Blue Sky covers all program areas along with fundamental nuclear studies
- Technical Quality Weight (peer review) – 80%

2012 Proposed Schedule

Proposed Schedule	Issue RPA or Expression of Interest	Issue CFP/RFA/FOA	Announce Awards
R&D	Sep. '11	Dec. '11	Apr. '12
IRP	Sep. '11	Nov. '11	May '12
Infrastructure	N/A	Jan. '12	Mar. '12
Scholarships & Fellowships	N/A	Nov. '11	Mar. '12

Summary of Improvements and New Programs 2012

- Space Power Component
- Integrated Research Projects, IRP – New Topics
- Expansion and improvement of Peer Review data base
- Enhancements to Fellowship and Scholarship Criteria
- Adopt NRC and NNSA Metrics as Appropriate to NEUP

NEUP R&D Projects

Projects are judged individually – perceived institutional reputation is not a factor.

USNWR Ranked in 2010		2009	2010	2011
1	University of Michigan, Ann Arbor	4	5	4
2	University of Wisconsin, Madison	10	5	4
3	Massachusetts Institute of Technology	2	0	1
4	Texas A&M University (Look)	5	0	3
5	Pennsylvania State University	0	3	3
	University of California, Berkeley	2	2	3
7	North Carolina State University	7	2	1
8	Georgia Institute of Technology	2	1	0
9	Oregon State University	0	0	1
	University of Florida	2	0	0
	University of Tennessee	0	2	2
12	Purdue University	0	0	0

NEUP R&D Projects

Ranked in 2010		2009	2010	2011
	University of Illinois, Urbana-Champaign	1	0	1
14	Rensselaer Polytechnic Institute	2	2	0
15	The Ohio State University	3	1	3
16	University of Missouri, Columbia	2	2	1
	University of New Mexico	1	0	0
18	Missouri University of Science & Technology	1	0	0
Others				
	Idaho State University	2	3	2
	University of Idaho	5	0	1
	University of Nevada, Las Vegas	5	2	1
	University of Cincinnati	1	2	0
	City College of NY	0	0	3

Examples of Interdisciplinary R&D Awards

- Modeling Solute Thermokinetics in LiCl-KCl Molten Salt for Nuclear Waste Separation – MSE, NE
- Monitoring Microstructural Evolution of Alloy 617 with Nonlinear Acoustics for Creep Fatigue – MSE, Civil E
- Development of Scanning Microscale Fast Neutron Irradiation Platform – Chem. Engr, EE, NE
- Heat Transfer Salts for Nuclear Reactor Systems – Civil E, NE
- Development of Thermal Transient Flow Rate Sensors for High T, Corrosive Environment – EE, ME
- Novel Methods of Tritium Sequestration – MSE, Chem. and Bio Engr.
- Precursor Derived Nanostructured SiC-X Materials – MSE, Aero. Engr.
- Understanding of Irradiation Behavior of Zirconium Carbide – NE, MSE
- Novel Engineered Refractory Materials – NE, MSE

Summary of Proposed New Programs and Procedures for 2012

- Programs:
  - Sustained NEUP Budget
  - Integrated Research Partnerships (PD)
  - Transformative Blue Sky(MS) – Aim for innovative faculty
  - Possible international collaborations
- Procedures:
  - Peer reviewer qualification process and database
  - Enhanced Peer Review Process and Feedback
  - Clear workscopes with broader reach
  - Consider smaller award amounts to increase numbers of awards

Continuous Improvement

- Feedback from survey
- Effective outreach/workshops
- NEUP IO Exec Committee
  - Corradini (NEAC), Azmy (NEDHO), Butler (TRTR), Nash, Lewis, Hines
- Meetings with NEAC, NEDHO, TRTR, others
- Integration with Labs, other agencies, industry
- Congressional and public advocacy

Concluding Remarks

- NEUP engages universities to conduct program directed, program supporting, and mission supporting R&D, infrastructure improvements, and S&F
- Through NEUP, DOE-NE has competed $167 Million of funding in 35 states at 75 universities since 2009
  - $121.4 Million in research projects
- Several changes for FY12 (new workscopes, reviewer database, IRP solicitation)
- Many opportunities for collaboration with all US universities including 2 year colleges and trade schools
- Coordination with IUP (NRC and NNSA)
- Comprehensive Workforce Survey in discussion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Thank You!!